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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/617,450

07/11/2003

Minh Van Ngo

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EXAMINER

TRAN, LONG K

ART UNIT

PAPER NUMBER

2818

DATE MAILED: 02/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/617,450	Applicant(s) NGO ET AL.	
	Examiner Long K. Tran	Art Unit 2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 14 is/are pending in the application.
- 4a) Of the above claim(s) 1 - 9 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 10 - 14 is/are rejected.
- 7) ☒ Claim(s) 10 and 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of **Group II**, claims **10 – 14** in the reply filed on December 23, 2004 is acknowledged.

Claim Objections

2. Claim **10** is objected to because of the following informalities:

Claim **10**, line 4: change "PBSG" to --BPSG--.

Claim **14**, line 1 and 2: change "a silicon oxide spacer" to --silicon oxide spacers--.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims **10** is rejected under 35 U.S.C. 102(b) as being anticipated by Huang et al. US Patent No. 6,080,639.

5. Regarding claim **10**, Huang et al. disclose a semiconductor device (flash memory) comprising:

Two gate electrode structures, spaced apart by a gap (figures 1 – 4), on a semiconductor (not shown under the gates structures. See column 4, lines 10 – 17);

an undoped oxide liner 110 (figures 1 – 4; column 3, line 15) on the gate electrode structures in the gap; and

a layer of boron (B) and phosphorous (PI-doped silicon oxide (PBSG) (figure 2; column 1, lines 22 – 25) on the undoped oxide liner filling the gap .

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim **11** is rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. US Patent No. 6,080,639.

8. Regarding claim **11**, Huang et al. disclose the claimed invention of claim 10 and the undoped oxide liner 110 having a thickness of 500 Å to 2000 Å.

This thickness range does not cover the range 400 Å to 500 Å as the claimed limitation.

However, it would have been well known in the art that the selection of those parameters such as **energy, concentration, temperature, time, molar fraction, depth, thickness, etc.**, would have been obvious and involve routine optimization which has been held to be within the level of ordinary skill in the art. "Normally, it is to be expected that a change in **energy, concentration, temperature, time, molar fraction, depth, thickness, etc., or in combination of the parameters** would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of

the prior art ... such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller* 105 USPQ233, 255 (CCPA 1955). See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmischer* 66 USPQ 314 (CCPA 1945); *In re Norman* 66 USPQ 308 (CCPA 1945); *In re Swenson* 56 USPQ 372 (CCPA 1942); *In re Sola* 25 USPQ 433 (CCPA 1935); *In re Dreyfus* 24 USPQ 52 (CCPA 1934).

Moreover, the thickness range 400 Å to 500 Å has not been alleged by applicant to be of significant importance for patentability.

9. Claims **12** and **13** are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. US Patent No. 6,080,639 in view of Tseng et al. US Patent Application Publication No. 2003/00033658).

10. Regarding claim **12**, Huang et al. disclose the claimed invention of claim 10 except for the undoped oxide liner comprises undoped silicon oxide derived from TEOS as cited in the present claim.

However, Tseng et al. show a flash memory comprising liner layer 40 (figure 4; column 2, [0018]) can be formed undoped silicate glass and PE-TEOS.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide the silicon oxide liner of Huang with the PE-TEOS layer of Tseng, in order protect the underlying layer during etching process.

Regarding claim **13**, Huang et al. disclose the claimed invention of claim 10 and the gate structures comprise:

a tunnel oxide on the semiconductor substrate (not shown under the gates structures. See column 4, lines 10 – 17);

a floating gate electrode (not labeled) on the tunnel oxide;

a dielectric layer (not labeled) on the floating gate; and

a control gate (not labeled) on the interpoly dielectric.

Huang et al. do not teach the interpoly comprises an ONO as cited in the present claim.

However, Tseng et al. show interpoly 20 (figure 2) is an ONO.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide the dielectric layer of Huang with the ONO of Tseng, in order keep electric charges, the electrons injected into the dielectric layer (ONO) are not evenly distributed within the entire silicon nitride layer.

11. Claim **14** rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. US Patent No. 6,080,639 in view of Tseng et al. US Patent Application Publication No. 2003/00033658) and further in view of Nakatani (US Patent No. 6,781,188).

12. Regarding claim **14**, Huang et al. and Tseng et al. disclose the claimed invention of claim 10 and claim 13 except for spacer (figure 4; not labeled) on side surfaces of the gate structures of Tseng flash memory being made of silicon oxide as cited in the present claim.

However, Yet et al. show silicon oxide sidewall spacers 40 (figure 4; column 4, lines 47 - 49) on the side of gate electrode structures 46 (figure 4).


It would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide the sidewall spacers of Tseng with the silicon oxide of Yeh et al., in order use spacers as a mask to form source and drain by implanting impurities into a substrate.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long K. Tran whose telephone number is 571-272-1797. The examiner can normally be reached on Mon-Thu.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on 571-272-1787. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Long Tran 
February 3, 2005


David Nelms
Supervisory Patent Examiner
Technology Center 2800